REMARKS

I. 35 U.S.C. § 103(a), Obviousness

The examiner has rejected claims 1-41 under 35 U.S.C. § 103(a) as being unpatentable over Komsthoeft et al., United States patent number 6,664,962 ("*Komsthoeft*"), in view of Ritchey, United States patent number 5,495,576 ("*Ritchey*"). This rejection is respectfully traversed.

In rejecting the claims, the examiner stated the following:

> As to claims 1, 8 and 16, Komsthoeft discloses a method in a data processing system for examining a three dimensional image (abstract, generating images of the shadow based on three dimensional image), the method comprising:
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> presenting an object, wherein the object includes a set of views for different angles of view for the object (column 12, lines 48 – 62); and
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> Komsthoeft discloses computer graphics, interactive graphics system such as home video game platforms and generating shadows using full scene shadow mapping in a low cost graphics system. Komsthoeft is silent about specifics details of outputting non-visual depth map.
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> Ritchey discloses panoramic image based virtual reality and audio-visual system and method. The system comprises of
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> responsive to a user input to traverse a view from the set of views (column 30, lines 55- 67, column 31, lines 1-66), transcoding a depth map for the view into a non-visual output (column 15, lines 1-25). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Komsthoeft to include specifics details of outputting non-visual depth map. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Komsthoeft by the teaching of Ritchey in order to provide interactive input device operable by a viewer to cause the generation, alteration, display of 3-D images on said display as suggested by Ritchey at column 2, lines 45- 55).

Office Action dated April 20, 2004, page 3.

A. The examiner bears the burden of establishing a *prima facie* case of obviousness.

The examiner bears the burden of establishing a *prima facie* case of obviousness based on the prior art when rejecting claims under 35 U.S.C. § 103(a). *In re Fritch*, 972

F.2d 1260, 23 U.S.P.Q.2d 1780 (Fed. Cir. 1992). In this particular case, the examiner has failed to establish a prima facie case of obviousness because the cited references do not include all of the features of the presently claimed invention as believed by the examiner. Further, one of ordinary skill in the art would not modify *Komsthoeft* with *Ritchey* when these references are considered as a whole.

B. All claim limitations must be considered, especially when missing from prior art.

Additionally, in comparing the cited references to the claimed invention, the features of the presently claimed invention may not be ignored in an obviousness determination.

The present invention in amended claim 1 reads as follows:

> 1. A method in a data processing system for examining a three dimensional image, the method comprising:
> presenting an object, wherein the object includes a set of views for different angles of view for the object;
> responsive to a user input to traverse a view from the set of views, transcoding a depth map for the view into a non-visual output; and
> sending the non-visual output to an assistive technology device.

The sections of the cited references pointed to by the examiner do not teach all of the fcatures the examiner believes to be taught by these references. Thus, a combination of these references even if proper, would not reach the presently claimed invention in claim 1.

For example, the examiner points to the following section of *Komsthoeft* for the presenting step in claim 1:

> FIG. 11 shows an example technique that uses the texture coordinate generating hardware within transform unit 300 to generate texture coordinates s, t representing distance for lookup into a ramp texture such as that shown in FIGS. 9A and 9B. In the example embodiment, a camera is configured to provide a certain angle of view, a certain position and a certain distance range. The camera distance range is parameterized by a nearz value (N) and a farz value (F)--with the depth range of the camera being specified by the distance between farz and nearz (i.e., F-N). These range parameters are used to transform a vertex position to provide an overall transformation of the vertex position from objcct space to light space that spreads out the dynamic range of the numerical

> precision the ramp provides so that it exactly "fits" the scene's depth range.

Komsthoeft, column 12, lines 48-62. As can be seen, this particular portion of *Komsthoeft* does not teach presenting an object in the manner recited in claim 1. Instead, this portion of *Komsthoeft* discloses a technique for using a texture coordinate generating hardware within a transform unit to generate texture coordinates representing a distance for lookup in a ramp texture. This particular portion of *Komsthoeft* does not teach presenting an object in which the object includes a set of views for different angles of view for the object as recited in independent claim 1.

If the examiner believes such a feature is taught by *Komsthoeft*, applicants respectfully request that the examiner point out the particular section in this cited reference for this step in claim 1. This cited section also teaches that the parameters are used to transform a vertex position to provide an overall transformation of the vertex position from object space to light space. This particular portion of *Komsthoeft* cited by the examiner, however, fails to teach the presenting step as recited in claim 1.

As another example, the examiner points to the following portion of *Ritchey* as teaching the transcoding step of claim 1:

> Commands to operate the computer system and graphics generation commands are entered by means of the viewer interaction devices which may include a keyboard and graphics input device. The graphics input device 66 may consist of one or more of a joystick, a trackball, a "mouse", a digitizer pad, a position sensing or pointing system, a non-contact viewer position and recognition sensing system, a voice recognition system, or other such devices. The graphic input device 66 may be operated as an input source 2 or as part of the participants interactive input system 10. Thc computer graphics system 19 includes a bit mapped video display generator wherein each pixel element or pixcl is accessible for generating high resolution images. The video display generator is connected to an input port by suitable conductor lines. The computer generated images are then further processed by the signal processing means 3 for display. The digital computer may be any type of computer system which has the required processing power and speed such as the type which are employed in 3-D computer graphic animation and paint applications. The computer system may function as a simulator controller if the display means of the present invention are used as simulators or as a game controller if the systems are employed as arcade games. The computer system may also be used to create special visual effects by combining artificial and animated scenes with live camera recorded scenes.

Ritchey, column 14, line 66-column 15, line 25. The cited portion teaches receiving commands through input devices, including joysticks, trackballs, and noncontact viewer position and recognition sensing systems. This portion of *Ritchey* also discloses the generation of images. The computer system disclosed in this cited section of *Ritchey* may function as a simulator controller. *Ritchey*, however, fails to teach or suggest transgerting a depth map for view into a non-visual output as recited in claim 1.

Further, this step in the cited reference is not initiated in response to a user input to traverse a view from a set of views. Nowhere does *Ritchey* teach or suggest that such as step is initiated in response to a user input to traverse a view from a set of views. *Ritchey* only generally teaches receiving user inputs in this cited section. Therefore, *Ritchey* does not teach or suggest the transcoding step of claim 1.

Additionally, amended claim 1 includes in the amendments an additional step in which the output is sent to an assistive technology device. No such feature is taught or suggested by either of the references alone or in combination.

Therefore, the combination of these two references would not reach the presently claimed invention because these references fail to teach the features pointed out by the examiner as being found within these references.

C. Stating that it is obvious to try or make a modification or combination without a suggestion in the prior art is not *prima facie* obviousness.

The mere fact that a prior art reference can be readily modified does not make the modification obvious unless the prior art suggested the desirability of the modification. *In re Laskowski*, 871 F.2d 115, 10 U.S.P.Q.2d 1397 (Fed. Cir. 1989) and also *see In re Fritch*, 972 F.2d 1260, 23 U.S.P.Q.2d 1780 (Fed. Cir. 1992) and *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1993). The examiner may not merely state that the modification would have been obvious to one of ordinary skill in the art without pointing out in the prior art a suggestion of the desirability of the proposed modification.

In this particular case, the examiner has combined *Komsthoeft* and *Ritchey* based on reasons or suggestions provided by the examiner in the office action, not based on the prior art. The examiner stated it would be obvious for someone of ordinary skill in the art to modify *Komsthoeft* to include the specific details of outputting a non-visual depth map.

This statement is made without pointing to any suggestion in the cited references or elsewhere in the prior art. Thus, even if *Ritchey* taught transcoding a depth map, such a modification of *Komsthoeft* would not have been made.

The examiner also states that it would have been obvious to modify *Komsthoeft* with the teaching of *Ritchey* pointing to the following portion of *Ritchey*:

> It is also an objective of this invention to provide interactive input devices operable by a viewer to cause the generation, alteration, display of 3-D images on said display assembly means; to provide associated 3-D audio systems; to provide alternative viewer interactive and feedback devices to operate the interactive input devices and associated processing means such that the resultant virtual environment is simultaneously effected before the viewers eyes; to provide an associated telecommunications system; and to provide a system for incorporation with a host vehicle, teleoperated vehicle, or robot.

Ritchey, column 2, lines 45-55. This portion of *Ritchey* pointed to by the examiner for the suggestion to combine the references discloses an objective to provide interactive input devices operable by a viewer to cause the generation, alteration, and display of 3-D images. Further, this portion of *Ritchey* discloses other objectives, such as providing a virtual environment for viewers eyes as well as providing a system for incorporation with a host vehicle, teleoperated vehicle, or robot.

This portion of *Ritchey*, however, does not provide any suggestion or incentive for combining transcoding of a depth map with presentation of a 3-dimensional image. *Ritchey* only discloses the desirability of generating 3-dimensional displays of images as well as providing virtual environments. Transcoding a depth map for a view from a set of views for an object into a non-visual output does not further the objective of providing generation, alteration, and display of 3-dimensional images in *Ritchey*. By transcoding a depth map or a view into a non-visual output, data is transformed into a non-visual display output, rather than an output that provides for the display of 3-dimensional images or for placing a resultant virtual environment before viewer eyes as stated in this cited section of *Ritchey*.

Thus, no teaching, suggestion, or incentive is present for combining these two references even if both references taught all of the features as believed by the examiner.

D. The proposed modification of the cited references would not be made when the cited references are considered as a whole.

"It is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." *In re Hedges*, 228 U.S.P.Q. 685, 687 (Fed. Cir. 1986). When *Komsthoeft* and *Ritchey* are considered as a whole, one of ordinary skill in the art would not be motivated to modify and combine these references in the manner suggested by the examiner.

In considering these references as a whole, one of ordinary skill in the art would consider the problems recognized. *Komsthoeft* is directed towards the following problem:

> Many of us have seen films containing remarkably realistic dinosaurs, aliens, animated toys and other fanciful creatures. Such animations are made possible by computer graphics. Using such techniques, a computer graphics artist can specify how each object should look and how it should change in appearance over time, and a computer then models the objects and displays them on a display such as your television or a computer screen. The computer takes care of performing the many tasks required to make sure that each part of the displayed image is colored and shaped just right based on the position and orientation of each object in a scene, the direction in which light seems to strike each object, the surface texture of each object, and other factors.
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> Because computer graphics generation is complex, computer-generated three-dimensional graphics just a few years ago were mostly limited to expensive specialized flight simulators, high-end graphics workstations and supercomputers. The public saw some of the images generated by these computer systems in movies and expensive television advertisements, but most of us couldn't actually interact with the computers doing the graphics generation. All this has changed with the availability of relatively inexpensive 3D graphics platforms such as, for example, the Nintendo 64.RTM. and various 3D graphics cards now available for personal computers. It is now possible to interact with exciting 3D animations and simulations on relatively inexpensive computer graphics systems in your home or office.

Komsthoeft, column 1, lines 23-49.

> A problem graphics system designers confronted in the past was how to draw shadows using low cost graphics systems. One known technique for accomplishing this is called shadow mapping. This

PAGE 15/19 * RCVD AT 6/28/2004 2:16:38 PM [Eastern Daylight Time] * SVR:USPTO-EFXRF-2/0 * DNIS:7466015 * CSID:972 367 2008 * DURATION (mm-ss):07-26

> technique allows a common z-buffer-based renderer to be used to generate shadows quickly on arbitrary objects. See Williams "Casting Curved Shadows on Curved Surfaces," Computer Graphics (SIGGRAPH '78 Proceedings), Volume 12, Number 3, pages 270-274 (August 1978). Using this technique, the graphics system renders the scene using the z-buffer algorithm with respect to the position and direction of the light source. For each pixel in the z buffer, the resulting rendered z depth contains the distance to the object that is closest to the light source. This depth map is called a shadow map. The scene is then rendered a second time, but this time with respect to the viewer (camera). As each drawing primitive is being rendered, its location (depth from the light) is compared to the shadow map. If a rendered point is further away from the light source than the value in the shadow map, that point is in shadow and its brightness is attenuated. If the rendered point is closer to the light source than the shadow map value, the point is illuminated by the light and is not in shadow.

Komsthoeft, column 1, line 57-column 2, line 12.

> An extension of Williams' shadow mapping technique proposed by Wang et al., "Second-Depth Shadow Mapping" (Department of Computer Science, University of North Carolina at Chapel Hill) solves certain self-shadowing problems (where a surface may cast a shadow onto itself due to lack of precision in the shadow comparison) by performing the shadow comparison based on the depth of a second surface defined by a primitive. Wang et al thus suggest using front-faced culling techniques to eliminate the first surface of primitives when generating the shadow map. This prevents limited precision depth comparisons from causing front surfaces to cast shadows upon themselves.

Komsthoeft, column 2, lines 37-48. *Komsthoeft* is directed towards problems associated with the generation of 3-dimensional graphics. Specifically, *Komsthoeft* recognizes problems associated with drawing shadows using low cost graphic systems.

In contrast, *Ritchey* is directed towards a different problem. *Ritchey* recognizes the following problem:

> My previous U.S. Pat. No. 5,130,794 describes a panoramic image based virtual reality system that incorporates a multi-lens camera system with spherical field-of-view (FOV) coverage. As shown in FIG. 2, objective lenses of the '794 camera system face outward with adjacent or overlapping FOV coverage. The imagery from the camera is surface mapped onto the interior of a three-dimensional(3-D) shape defined in a special effects processor of a computer. Alternatively, the input source is at least one computer graphics system that generates three-dimensional graphics of spherical FOV coverage. The viewer operates interactive input

> devices associated with the computer to manipulate the texture mapped virtual images. The virtual environment is instantaneously affected before the viewer and displayed on either a head-mounted display assembly or on contiguous display units positioned beneath, to the sides, and above the viewer.
>
> Limitations of the panoramic video camera system in '794 are that the panoramic camera does not record a non-spherical field of view(FOV) and does not incorporate a non-contact shape sensor.

Ritchey, column 1, lines 21-42. *Ritchey* recognizes limitations with camera systems, especially with panoramic video camera systems in which these systems do not record a non-spherical field of view and do not incorporate a non-contact shape sensor.

In summary, *Komsthoeft* is directed towards problems associated with drawing or creating shadows using low cost graphic systems while *Ritchey* is concerned with limitations of panoramic video camera systems including limitations with non-spherical field of view. Thus, these two references are concerned with and recognize different problems.

These two references also provide vastly different solutions to the different problems. *Komsthoeft* teaches the following solution:

> The present invention solves the numerical precision problem while providing techniques and arrangements that perform full scene shadow mapping using low cost, limited precision hardware such as that found, for example, in home video game platforms and personal computer graphics accelerators.
>
> One aspect of the invention uses a texture coordinate generator to assist in calculating distance between light position and a primitive surface at a precision that is based on the dynamic depth of the scene. A texture mapper uses the generated texture coordinates to look up a precision distance value from a ramp function stored as a texture. The resulting precision distance value can be compared with the corresponding depth value in the shadow map to determine whether or not the pixel is in shadow.

Komsthoeft, column 3, lines 35-49. *Komsthoeft* discloses the use of a texture coordinate generator to assist in calculating distance between light position and a primitive surface using a position that is based on the dynamic depth of the scene. The generated coordinates are used to look up a precision distance value with this value being compared to the corresponding depth in a shadow map to determine whether or not a pixel is in a

shadow. As can be seen, the solution in *Komsthoeft* is directed towards determining whether particular pixels are located within a shadow.

In contrast to *Komsthoeft, Ritchey* teaches the following solution:

> It is therefore the objective of this invention to provide a more versatile image based panoramic virtual reality and telepresence system and method. Still another objective is to produce systems and methods for recording, formatting, processing, displaying, and interacting with data representing 3-D beings, objects, and scenes. More specifically, an objective of this invention is to provide a positionable multi-lens camera system for recording contiguous image segments of an object, being, adjacent surrounding scene, or any combination of these types of subjects; a signal processing means comprising first computerized fusion processing system for integrating the positional camera system with corresponding digitized shape and contour data; a second computerized fusion processing system for integrating first fused data with other fused data representing adjacent portions of a being, object, or scene comprising a panoramic computer generated model; where various 3-D digitizer systems may be incorporated for entering 3-D shape and contour data into a image processing computer; a third processing means to manipulate the geometry of subjects comprising the virtual model; a forth processing means for sampling out given fields of regard of the virtual model for presentation and distribution to display units and audio speakers; where signal processing means includes an expert system for determining the actions of subjects of the computer generated model; where the signal processing means includes image segment circuit means for distributing, processing, and display of the model; where the system includes a 3-D graphics computer system for the generation, alteration, and display images; and a system and method for image based recording of 3-D data which may be processed for display on various 3-D display systems to include head mounted display systems, and room display systems with stereographic, autostereoscopic, or holographic display systems.

Ritchey, column 2, lines 10-44. *Ritchey* discloses a positionable multi-lens camera system for recording continuous image segments of an object. *Ritchey* teaches a system and method for panoramic virtual reality and telepresence.

Thus, when these two references are considered as a whole, one of ordinary skill in the art would not be motivated to combine them to reach the presently claimed invention in claim 1.

E. The presently claimed invention may be reached only though an improper use of the disclosed invention as a template to piece together and modify the prior art.

The claimed invention may not be used as an "instruction manual" or as a "template" in an obviousness determination.

Moreover, the examiner may not use the claimed invention as an "instruction manual" or "template" to piece together the teachings of the prior art so that the invention is rendered obvious. *In re Fritch*, 972 F.2d 1260, 23 U.S.P.Q.2d 1780 (Fed. Cir. 1992). Such reliance is an impermissible use of hindsight with the benefit of applicant's disclosure. *Id.* Therefore, absent some teaching, suggestion, or incentive in the prior art, *Komsthoeft* and *Ritchey* cannot be properly combined to form the claimed invention. As a result, absent any teaching, suggestion, or incentive from the prior art to make the proposed combination, the presently claimed invention can be reached only through an impermissible use of hindsight with the benefit of applicant's disclosure as a model for the needed changes.

Therefore, the rejection of claims 1-41 under 35 U.S.C. § 103(a) has been overcome.